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14. ABSTRACT

Surface moorings have been used to collect high quality meteorological and oceanographic data in a variety of locations throughout the world's oceans. The experimental sites range from open ocean to coastal, span climatic regimes from tropical to subarctic, and include variety of forcing regimes from benign to severe. These data represent a valuable resource, but not all of the records are readily accessible and some are in danger of becoming unrecoverable. In addition, the records have not been processed in a cosistent manner and are not available in a standard format. We propose to make these data readily available and analyze them from a global perspective. The first phase of the proposed work will be to recover all of the data sets, reprocess them as necessary, and produce a CD-Rom containing data from the twenty experients in a common format. A browser-based interface will be developed to allow easy access to both the CD-Roms and a copy of the data available in real-time over the World Wide Web. The second phase of the project will use the data archive to address

15. SUBJECT TERMS

(See attached)

Upper Ocean Climatology, Moored observations, meteorological and oceanographic data.

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Abstract Continued

two upper ocean climatology issues. First, the vertical strucutre of wind driven flow will be examined and the performance of mixed layer models in simulating that flow will be assessed. Second, the variability of internal wave energy in the upper ocean and its relationship to the energy input by the local wind will be investigated.

Upper Ocean Climatology from Moored Observations

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LONG-TERM GOALS

The long term goal is to provide data that will enable scientific analyses, model development, and engineering design studies which require coincident surface meteorology and upper ocean observations from a variety of environmental regimes.

OBJECTIVES

There were two specific objectives for the project. First, coincident records of surface forcing and upper ocean variability from twenty surface mooring experiments were to be re-processed, archived, and made available to the community. Second, the updated data sets were to be used to investigate the climatologies of wind-driven flow and internal waves in the upper ocean.

APPROACH

Surface moorings have been deployed by the Woods Hole Oceanographic Institution to collect meteorological and oceanographic data in a series of experiments starting in the early 1980s. The experimental sites range from open ocean to coastal, span climatic regimes from tropical to subarctic, and include variety of forcing regimes from benign to severe. High quality meteorological records, high temporal and vertical resolution ocean data, and good overall documentation make these data sets unique. The approach to this project was to create a database of meteorological and oceanographic data from these surface mooring experiments that could be made broadly available via a web-based server.

TASKS COMPLETED

Data from 13 experiments have been examined, reprocessed (if necessary), and "archived" in a standard format (NetCDF; Rew et al., 1993). Associated descriptive information (metadata) was compiled from various sources, and summary text, tables, and figures were generated. Web pages, based on HTML "templates", were produced for each of the 13 experiments. These pages describe the data and provide access to data files in a variety of formats. A front page for the web server was developed to provide general information and to link the experiments together. The workstation containing the database was configured as a Distributed Oceanographic Data System (DODS; Sgouros, 1999) server. We have demonstrated that the data sets presented on our web server are available using DODS protocol, although they are not yet part of the formal DODS Dataset listing.

RESULTS

The principal result is the Upper-Ocean Mooring Data Archive web site (http://www.uop.edu/uopdata) which presently contains data and metadata for 13 of the 20 experiments. The archive contains approximately 20 buoy-years of meteorological and oceanographic records, representing over 80% of the total available data. The site is still under development, but has been used successfully to provide data sets to several investigators during the past year. Data are organized by experiment and can be identified using a list, a time line, or a geographic map.

The process of compiling and evaluating the data sets for presentation on the web server revealed some unexpected shortcomings. Although data files were available for most of the experiments, they were not of uniform quality or completeness. In several cases the relatively straightforward process of presenting available data and metadata on the the web site was complicated by an unanticipated "data archeology" effort.

IMPACT/APPLICATIONS

Numerical weather prediction products can be evaluated by comparison with high-quality in-situ fluxes from the buoys, potentially motivating improvements to flux parameterizations and atmospheric physics in the models. The sensitivity of oceanographic models to high-frequency (hours to days) forcing can be determined using the combined air-sea flux and upper ocean data from the moorings. Satellite-based estimates of surface fluxes can be evaluated by comparison with in-situ data. Design and performance studies of ocean structures can be done using the in-situ data to provide realistic wind and current forcing for different oceanographic regions.

RELATIONSHIPS TO OTHER PROGRAMS

We are working with Peter Cornillon's group at the University of Rhode Island to ensure that our moored data archive will be accessible through DODS, as described above.

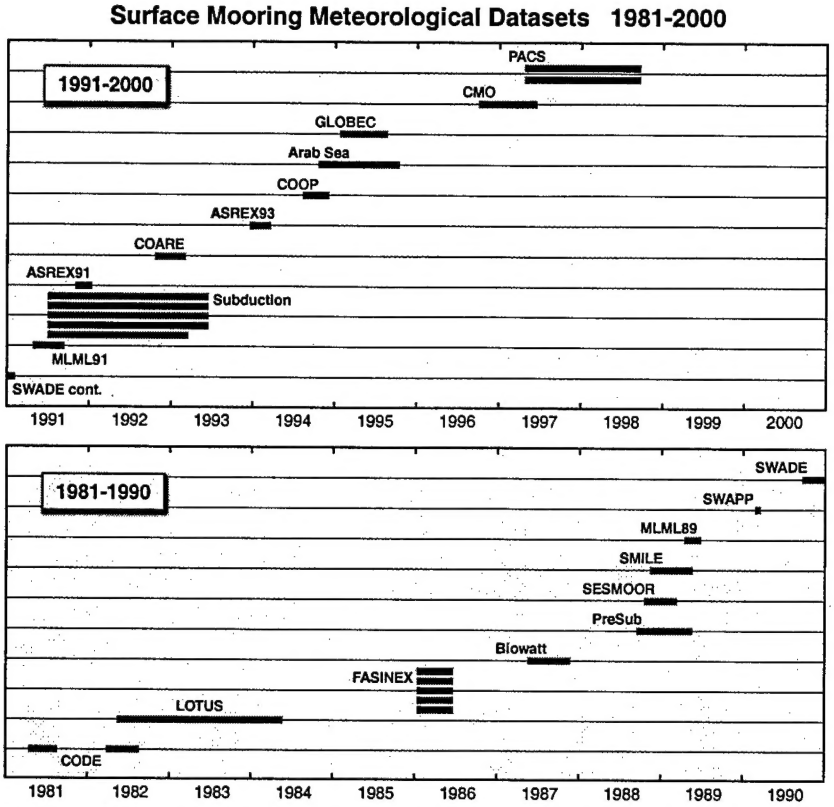

Figure 1. Timeline of surface mooring experiments from 1981 and 2000. Horizontal bars represent the duration of independent meteorological records. Multiple bars for a single experiment indicate widely separated moorings within an array.

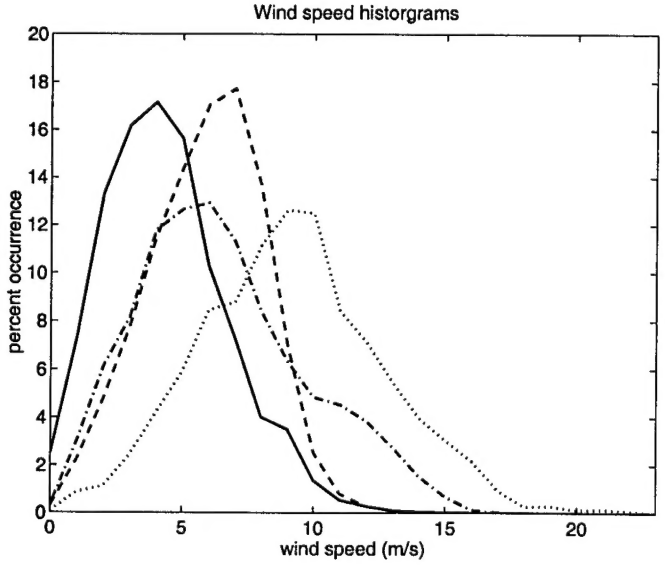

Figure 2. Example of surface forcing variability. Histograms of wind speed are shown for TOGA COARE (solid), Subduction (dashed), Arabian Sea (chain dash), and ASREX-91 (dotted).

REFERENCES

Rew, R., G. Davis and S. Emmerson, 1993. NetCDF User's Guide. Unidata Program Center, University Corporation for Atmospheric Research, Boulder, Colorado, 185 pp.

Sgouros, T., 1999. DODS User Guide, University of Rhode Island and Massachusetts Institute of Technology, 102 pp.